

REMARKS

Applicants respectfully request further examination and favorable reconsideration in view of the above amendments and the remarks set forth fully below. Claims 1-68 were pending. Within the Office Action, claims 19-43 were allowed, claims 1-10, 12-18, 44-53, 56-60, 62-65 and 67 were rejected and claims 11, 54, 55, 61, 66 and 68 were objected to. In response, the Applicant has amended claims 44 and 47 and has submitted the following remarks. Accordingly, claims 1-68 are now pending.

Rejections Under 35 U.S.C. § 112

Within the Office Action, claims 44-49 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention. More particularly, within the Office Action it is stated that claims 44 and 47 are indefinite for insufficient antecedent basis for a limitation in each claim. Accordingly, the Applicant has amended claims 44 and 47 to provide sufficient antecedent basis. Applicant respectfully submits that claims 44 and 47 are now in condition for allowance.

Additionally, claims 45 and 46 are dependent upon the independent claim 44. Claims 48 and 49 are dependent upon the independent claim 47. As described above, the independent claims 44 and 47 now have sufficient antecedent basis. Accordingly, claims 45, 46, 48 and 49 are all also allowable as being dependent upon allowable base claims.

Rejections Under 35 U.S.C. § 103

Within the Office Action, claims 1-10, 12-18, 63-65 and 67 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,511,220 to Scully (hereinafter Scully) in view of U.S. Patent No. 6,163,402 to Chou et al. (hereinafter Chou). Specifically, it is stated within the Office Action that Scully illustrates a laser system arrangement to eliminate speckle and that Chou discloses a screen with a diffuser.

Scully teaches an apparatus for eliminating the phenomenon of speckle with regard to laser light reflected from a distant target whose roughness exceeds the wavelength of the laser light. (Scully, Abstract) As cited in the Office Action, Scully teaches an apparatus including a half plate wave member, a first polarizing beam splitter member, a totally reflecting right angle prism, and a second polarizing beam splitter member, all of which are in serial optical alignment, that are used in combination to convert a linearly (i.e., vertically) polarized light beam, which is

emitted by a laser having a known coherence length, into two coincident, orthogonally polarized, beams that are not coherent with each other, and that have an optical path difference which exceeds the known coherence length of the emitting laser, to eliminate the speckle. (Scully, Abstract) As recognized within the Office Action, Scully teaches neither which particular target the output beam is illuminated on a depolarizing screen or utilizing a single beam splitter to split an input beam into two components and recombine the components to output the combination onto a depolarizing screen.

Chou teaches a rear projection screen assembly that includes a diffuser and a polarizer. (Chou, Abstract) Chou teaches that "...it is generally desirable to use a diffusing element 101 that does not significantly depolarize the image light as it is diffused by and transmitted through the diffuser element." (Chou, col. 3, lines 38-41) Chou also teaches that speckle relates generally to coherent interference and destroying the coherence of the illumination beam may reduce speckle. (Chou, col. 5, lines 22-26) It is stated within the Office Action that Chou discloses a diffuser, which depolarizes light. However, Chou teaches that it is "generally desirable" for a diffuser to "not significantly depolarize". (Chou, col. 3, lines 39-40) Accordingly, neither Scully, Chou nor their combination teach a single polarizing beam splitter dividing a first polarized laser output into two components, recombining the two components after causing a coherence length delay in one component and projecting the recombined beam onto a depolarizing screen.

No *prima facie* case of obviousness has been met based on the teachings of Scully and Chou. To establish a *prima facie* case of obviousness, three basic criteria must be met. There must first be some suggestion or motivation demonstrated, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the teachings of the references. Secondly, there must be a demonstration that the combination of the prior art references would result in a reasonable expectation of success. Finally, the combination of the prior art references must teach or suggest all the claim limitations. [M.P.E.P. § 2142-43.]

There is no suggestion or motivation to combine Scully and Chou. As discussed above, Scully teaches an apparatus for eliminating the phenomenon of speckle with regard to laser light reflected from a distant target whose roughness exceeds the wavelength of the laser light. Chou discloses a screen with a diffuser. Therefore, it would not have been obvious to one skilled in the art to combine the teachings of Scully and Chou. Scully teaches a beam splitter apparatus and Chou teaches a screen. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In Re Mills, 916 F.2d 680, 16 USPQ 2d 1420 [Fed. Cir. 1990]. Within the current

Office Action, there has not been any reference to any teaching, hint or suggestion in either Scully or Chou suggesting the desirability of a combination of these two references.

In fact, even if Scully and Chou are combined as proposed within the Office Action, the result would necessarily constitute a system different from that of the present invention, and one that would not accomplish the result of the claimed invention.

In contrast to the teachings of Scully, Chou and their combination, the method and apparatus of the present invention reduces speckle using polarization averaging. A polarizing beam splitter divides a first polarized laser output into a second polarized laser output and a third polarized laser output. A plurality of mirrors creates an optical path difference between the second and third polarized laser outputs. The optical path difference is at least about a coherence length for the first polarized laser output. The second and third polarized laser outputs are combined into a fourth laser output, which illuminates a depolarizing screen. (Present Invention, Abstract) As described above, neither Scully, Chou nor their combination teach splitting a beam with a single beam splitter, recombining the beam with at least about a coherence length difference and illuminating a depolarizing screen with the recombined beam.

The independent claim 1 is directed to an apparatus for reducing laser speckle having a polarizing beam splitter configured to divide a first polarized laser output into a second polarized laser output and a third polarized laser output, the first polarized laser output having a coherence length, a light guide configured to create an optical path difference between the second polarized laser output and the third polarized laser output, the optical path difference being at least about the coherence length, the light guide being configured to direct the second polarized laser output to the polarizing beam splitter such that the polarizing beam splitter combines the second polarized laser output and the third polarized laser output into a fourth laser output and a depolarizing screen coupled to the fourth laser output, the fourth laser output illuminating the depolarizing screen. As described above, neither Scully, Chou nor their combination teach splitting the beam with a single splitter and a depolarizing screen coupled to the fourth laser output. For at least these reasons, the independent claim 1 is allowable over the teachings of Scully, Chou and their combination.

Claims 2-10 and 12-15 are dependent on the independent claim 1. As discussed above, the independent claim 1 is allowable over the teachings of Scully, Chou and their combination. Accordingly, the dependent claims 2-10 and 12-15 are also allowable as being dependent on an allowable base claim.

The independent claim 16 is directed to a method of reducing laser speckle comprising the steps of dividing a first polarized laser output into a second polarized laser output and a third

polarized laser output, the first polarized laser output having a coherence length, the second polarized laser output and the third polarized laser output having orthogonal polarizations and having intensities that are about equal, creating an optical path difference between the second polarized laser output and the third polarized laser output, the optical path difference being at least about the coherence length and combining the second polarized laser output and the third polarized laser output into a fourth laser output and illuminating a depolarizing screen with the fourth laser output. As described above, neither Scully, Chou nor their combination teach splitting the beam with a single splitter and illuminating a depolarizing screen coupled to the fourth laser output. For at least these reasons, the independent claim 16 is allowable over the teachings of Scully, Chou and their combination.

Claims 17 and 18 are dependent on the independent claim 16. As discussed above, the independent claim 16 is allowable over the teachings of Scully, Chou and their combination. Accordingly, the dependent claims 17 and 18 are also allowable as being dependent on an allowable base claim.

The independent claim 63 is directed to an apparatus for reducing laser speckle having a means for dividing a first polarized laser output into a second polarized laser output and a third polarized laser output, the first polarized laser output having a coherence length, the second polarized laser output and the third polarized laser output having orthogonal polarizations and having intensities that are about equal, a light guide coupled to the second polarized laser output, the light guide creating an optical path difference between the second polarized laser output and the third polarized laser output, the optical path difference being at least about the coherence length, and means for combining the second polarized laser output and the third polarized laser output into a fourth laser output and a depolarizing screen coupled to the fourth laser output. As described above, neither Scully, Chou nor their combination teach splitting the beam with a single splitter and illuminating a depolarizing screen coupled to the fourth laser output. For at least these reasons, the independent claim 63 is allowable over the teachings of Scully, Chou and their combination.

Claims 64, 65 and 67 are dependent on the independent claim 63. As discussed above, the independent claim 63 is allowable over the teachings of Scully, Chou and their combination. Accordingly, the dependent claims 64, 65 and 67 are also allowable as being dependent on an allowable base claim.

Within the Office Action, claims 50-52 and 56-58 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,404,365 to Hiironaka (hereinafter Hiironaka) in view of Chou. Specifically, it is stated within the Office Action that Hiironaka illustrates different laser

outputs being combined by polarizing beam splitters, where the lasers output beams have orthogonal polarization as illustrated and that Chou discloses a screen with a diffuser.

Hiiro teaches a polarized light coherent combining laser apparatus comprising a plurality of units, each of which is constituted of a polarizing element and a phase difference plate. (Hiiro, Abstract) As cited in the Office Action, Hiiro illustrates different laser outputs being combined by polarizing beam splitters, where the lasers output beams have orthogonal polarization. However, Hiiro does not teach a first polarized light output being incoherent with the second polarized laser output. Also, as recognized within the Office Action, Hiiro does not disclose a depolarizing screen.

It is stated within the Office Action that Chou discloses a diffuser, which depolarizes light. However, Chou teaches that it is "generally desirable" for a diffuser to "not significantly depolarize". (Chou, col. 3, lines 39-40) Accordingly, neither Hiiro, Chou nor their combination teach an apparatus with means for combining a first polarized laser output and a second polarized laser output where the first polarized laser output is incoherent with the second polarized laser output, where the combination of the first and second outputs are coupled to a depolarizing screen.

No *prima facie* case of obviousness has been met based on the teachings of Hiiro and Chou. To establish a *prima facie* case of obviousness, three basic criteria must be met. There must first be some suggestion or motivation demonstrated, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the teachings of the references. Secondly, there must be a demonstration that the combination of the prior art references would result in a reasonable expectation of success. Finally, the combination of the prior art references must teach or suggest all the claim limitations. [M.P.E.P. § 2142-43.]

There is no suggestion or motivation to combine Hiiro and Chou. As discussed above, Hiiro teaches a polarized light coherent combining laser apparatus comprising a plurality of units, each of which is constituted of a polarizing element and a phase difference plate. Chou discloses a screen with a diffuser. Therefore, it would not have been obvious to one skilled in the art to combine the teachings of Hiiro and Chou. Hiiro teaches a combining laser and Chou teaches a screen. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In Re Mills, 916 F.2d 680, 16 USPQ 2d 1420 [Fed. Cir. 1990]. Within the current Office Action, there has not been any reference to any teaching, hint or suggestion in either Hiiro or Chou suggesting the desirability of a combination of these two references.

In fact, even if Hihiro and Chou are combined as proposed within the Office Action, the result would necessarily constitute a system different from that of the present invention, and one that would not accomplish the result of the claimed invention.

The independent claim 50 is directed to an apparatus for reducing laser speckle comprising means for combining a first polarized laser output and a second polarized laser output, the first polarized laser output being incoherent with the second polarized laser output, the first polarized laser output and the second polarized laser output having orthogonal polarizations, whereby a third laser output is formed and a depolarizing screen coupled to the third laser output. As described above, neither Hihiro, Chou nor their combination teach the first polarized laser output being incoherent with the second polarized laser output and a depolarizing screen coupled to the fourth laser output. For at least these reasons, the independent claim 50 is allowable over the teachings of Hihiro, Chou and their combination.

Claims 51 and 52 are dependent on the independent claim 50. As discussed above, the independent claim 50 is allowable over the teachings of Hihiro, Chou and their combination. Accordingly, the dependent claims 51 and 52 are also allowable as being dependent on an allowable base claim. It is stated within the Office Action that claim 53 has been rejected. However, the basis of rejection is not stated in the Office Action. Regardless of the basis of rejection, claim 53 is dependent on the independent claim 50 and is likewise allowable as being dependent on an allowable base claim.

The independent claim 56 is directed to a method of reducing laser speckle comprising the steps of combining a first polarized laser output and a second polarized laser output to form a third laser output, the first polarized laser output being incoherent with the second polarized laser output, the first polarized laser output and the second polarized laser output having orthogonal polarizations, and illuminating a depolarizing screen with the third laser output. As described above, neither Hihiro, Chou nor their combination teach the first polarized laser output being incoherent with the second polarized laser output and illuminating a depolarizing screen with the fourth laser output. For at least these reasons, the independent claim 56 is allowable over the teachings of Hihiro, Chou and their combination.

Claims 57 and 58 are dependent on the independent claim 56. As discussed above, the independent claim 56 is allowable over the teachings of Hihiro, Chou and their combination. Accordingly, the dependent claims 57 and 58 are also allowable as being dependent on an allowable base claim.

Within the Office Action claims 59, 60 and 62 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,862,164 to Hill (hereinafter Hill) in view of

Chou. Specifically, it is stated within the Office Action that Hill discloses an electro-optical polarization rotator and that Chou discloses a screen with a diffuser.

Hill teaches an electro-optical apparatus that transforms a single frequency, linearly polarized laser input beam from a light source into an output beam having two collinear orthogonally polarized output beam components differing in frequency from each other by the frequency of a stabilized electrical signal provided from an electronic oscillator. (Hill, Abstract) As cited in the Office Action, Hill does not disclose a depolarizing screen.

It is stated within the Office Action that Chou discloses a diffuser, which depolarizes light. However, Chou teaches that it is "generally desirable" for a diffuser to "not significantly depolarize". (Chou, col. 3, lines 39-40) Accordingly, neither Hill, Chou nor their combination teach an apparatus for or method of reducing laser speckle by rotating a polarization of a laser output, whereby a rotating polarization is formed, the rotating polarization being driven with a rotation frequency and illuminating a depolarizing screen with the laser output, the rotation frequency being sufficient to reduce laser speckle.

No *prima facie* case of obviousness has been met based on the teachings of Hill and Chou. To establish a *prima facie* case of obviousness, three basic criteria must be met. There must first be some suggestion or motivation demonstrated, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the teachings of the references. Secondly, there must be a demonstration that the combination of the prior art references would result in a reasonable expectation of success. Finally, the combination of the prior art references must teach or suggest all the claim limitations. [M.P.E.P. § 2142-43.]

There is no suggestion or motivation to combine Hill and Chou. As discussed above, Hill teaches an electro-optical polarization rotator. Chou discloses a screen with a diffuser. Therefore, it would not have been obvious to one skilled in the art to combine the teachings of Hill and Chou. Hill teaches a polarization rotator and Chou teaches a screen. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In Re Mills, 916 F.2d 680, 16 USPQ 2d 1420 [Fed. Cir. 1990]. Within the current Office Action, there has not been any reference to any teaching, hint or suggestion in either Hill or Chou suggesting the desirability of a combination of these two references.

In fact, even if Hill and Chou are combined as proposed within the Office Action, the result would necessarily constitute a system different from that of the present invention, and one that would not accomplish the result of the claimed invention.

The independent claim 59 is directed to an apparatus for reducing laser speckle comprising means for rotating a polarization of a laser output, whereby a rotating polarization is formed, the rotating polarization being driven with a rotation frequency and a depolarization screen coupled to the laser output, the rotation frequency being sufficient to reduce laser speckle. As described above, neither Hill, Chou nor their combination teach the means for rotating a polarization of a laser output forming a rotating polarization combined with a depolarizing screen. For at least these reasons, the independent claim 59 is allowable over the teachings of Hill, Chou and their combination.

Claim 60 is dependent on the independent claim 59. As discussed above, the independent claim 59 is allowable over the teachings of Hill, Chou and their combination. Accordingly, the dependent claim 60 is also allowable as being dependent on an allowable base claim.

The independent claim 62 is directed to a method of reducing laser speckle comprising the steps of rotating a polarization of a laser output, whereby a rotating polarization is formed, the rotating polarization being driven with a rotation frequency and illuminating a depolarization screen with the laser output, the rotation frequency being sufficient to reduce laser speckle. As described above, neither Hill, Chou nor their combination teach forming a rotating polarization by rotating an output polarization combined with illuminating a depolarization screen. For at least these reasons, the independent claim 62 is allowable over the teachings of Hill, Chou and their combination.

Allowable Subject Matter

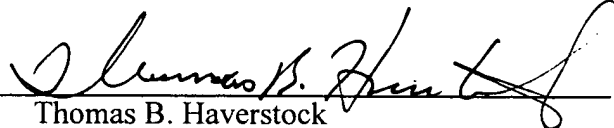
Within the Office Action it is stated that claims 19-43 have been allowed and claims 11, 54, 55, 61, 66 and 68 have been objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 11 is dependent upon the independent claim 1. claims 54 and 55 are dependent upon the independent claim 50. Claim 61 is dependent upon the independent claim 59. Claims 66 and 68 are ultimately dependent upon the independent claim 63. As described above, claims 1 and 63 are allowable over the teachings of Scully in view of Chou, claim 50 is allowable over the teachings of Hiro in view of Chou and claim 59 is allowable over the teachings of Hill in view of Chou. Accordingly, claims 11, 54, 55, 61, 66 and 68 are also allowable as being dependent upon an allowable base claim.

For the reasons given above, Applicant respectfully submits that the claims are now in a condition for allowance, and allowance at an early date would be appreciated. Should the Examiner have any questions or comments, he is encouraged to call the undersigned at (408) 530-9700 to discuss the same so that any outstanding issues can be expeditiously resolved.

Respectfully submitted,
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Dated: 4-29-03

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CERTIFICATE OF MAILING (37 CFR § 1.8(a)).
I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the U.S. Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the: Assistant Commissioner for Patents, Washington D.C. 20231

HAVERSTOCK & OWENS LLP.

Date: 04/23/02 By: 